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Aquaculture Potential of Sea Bass (*Dicentrarchus Labrax)* in Brackish Water Fish Farms in Egypt

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Abstract: In this study, growth performance parameters of sea bass (*Dicentrarchus labrax*) were investigated in a brackish water fish farm at Shata City, Damietta Governorate, Egypt. Fish were stocked in July, 2005 and growth performance were followed until August, 2006. Fish (n=4000) with an initial mean total length of 7.96 ± 3.1 cm /fish, body weight of 5.34 ± 3.63 g/fish and condition factor of 1.06 were stocked in a pond with an area of 1 feddan(4200 m^3). At the end of the experiment (August,2006), mean total length, mean body weight and average condition factor were determined as 38.18 ± 6.22 cm/ fish, 517.55 ± 88.76 gm/fish and 1.05 respectively. It was observed that growth was almost ceased after November. When water temperature dropped below 15 ^{0}C, fish's growth rate decreased between December and March, then growth increased depending on water temperature. The final production of sea bass (*Dicentrarchus labrax*) reared under semi-intensive conditions was 1900 kg/feddan with a mortality rate of 8.23%.

Key words: Sea bass (*Dicentrarchus labrax*), earthen ponds, brackish water, growth performance, production.

INTRODUCTION

Sea bass (*Dicentrarchus labrax*) is one of the most important commercial fish species in Egypt and it is commonly used in aquaculture. Sea bass (*Dicentrarchus labrax*) is an euryhaline fish[14] and for this reason, it is important for marine and brackish water fish farming. Sea bass is an economically important cultured fish species in the Mediterranean coastal waters. The market demand is great and as a result, the price for fresh sea bass has increased markedly over the past decade due to the desirable aroma and quality attributes of this fish; consequently, its farming is deemed to be a profitable business. Thus, many fish farms on the Mediterranean coasts have gradually expanded their annual production from 581 tones in 1995 to 53307 tones in 1999 [6]. The catch of sea bass (*Dicentrarchus labrax*) in Egypt from the Mediterranean has fluctuated between 266 tons in 1991 and 559 tons in 1998 [8].

Many studied have been made on the sea bass (*Dicentrarchus labrax*) all over the world. Bou Ain[3] studied the morphology, anatomy and biology of these fishes in the waters of Tunisia at Mediterranean Sea. Population of sea bass size and age at maturity were studies by Kennedy and Fitzmaurice[13] Holden and Williams[11,12,23]. Age and growth of young (*Dicentrarchus labrax*) were studied by Ottaway and Simkiss[16,4].

Feeding habits of sea bass (*Dicentrarchus labrax*) have been studied by [25,24].

In the recent years, many studies have been made on sea bass (*Dicentrarchus labrax*) all over the world [15,17,7,10,1,9,22,20,18].

The present study deals with the semi-intensive culture of sea bass (*Dicentrarchus labrax*) reared in brackish water fish farms. The aim of the present work is to study the commercial production of the fish (*Dicentrarchus labrax*) *in* fish farms.

MATERIALS AND METHODS

The present work was carried out at a brackish water fish farm at Shata city, Damietta Governorate, Egypt in an area of 1 feddan (4200 m^3) with an average depth of about 1.25 m. Sea bass *(Dicentrarchus labrax*) fingerlings with a total length ranged from 5.3 cm to 9.5 cm (average length of 7.96 ±3.1 cm) and an average weight of 5.34 ±3.63 gm (weight range from 1.47—9.08 gm) were stocked in July, 2005 with a total number of 4000 fish / feddan. Water temperature, dissolved oxygen concentrations, PH and salinity values were measured daily. Fish were fed on fresh small shrimp and small tilapia (Table 3).

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At monthly intervals, a sample of 30 of fish were taken randomly and total lengths and body weights of individual fish were measured for determining growth rate and condition factor. The total length (L) and total weight (W) of the individual fish in the sample were measured to the nearest 0.1cm and 0.1gm respectively. The amount of food offered was readjusted after each sampling process. The total average weight of fish is based on the assumption that all stocked fish had survived. At the end of the experiment (August, 2006), pond was drained and fish were collected and weighed.

RESULTS AND DISCUSSION

During the rearing period, water temperature ranged from 12.5 ^{0}C during winter months to 28.5 ^{0}C during summer months.

The oxygen content was minimum (average 6.5mg/L) during summer months, and maximum (average 9.5 mg/L) during winter months with an average of 7.7 mg/L.

PH was within the normal ranges advised for fish culture and its average value was 8.1.

The salinity fluctuated between 13 gm/L in winter and 22.5 gm/L during summer months with an average of 18.2 gm/L.

Finfish require higher dietary protein levels than domestic terrestrial monogastric animals[21]. For this reason, only feedstuffs with high protein contents are potential protein sources for fish. The fish were fed on small fresh shrimp during the present work. *Dicentrarchus labrax* is a carnivorous fish.[13] found that *Dicentrarchus labrax* utilize shrimps, prawns and small shore crabs. Tortonese[24] mentioned that sea bass feeds chiefly on shrimps, molluscs and fishes.[5] suggested a dietary protein level of 43% in sea bass diets.[20] estimated the protein requirements for European sea bass to be 48% in diets.[1] used a diet containing 46% protein for sea bass cultured in net cages. On the contrary,[21] postulated that the reduction of dietary protein level did not significantly affect growth rate but significantly increased feed intake and decreased feed efficiency of sea bass.

Stocking of fish was started with fingerlings to avoid the high mortality in case of fry stocking. The mortality rate was low (8.23%) as shown in table (2). [15] recorded a survival rate of 11% (i.e. mortality rate of 89%) for one hundred days after hatching of sea bass (*Dicentrarchus labrax).* The mortality rate obtained by this author may be due to cannibalism.

The average length, weight, monthly increment in weight, daily gain in weight and condition factor of the cultured sea bass (*Dicentrarchus labrax)* during the rearing period are shown in table (1) and figure (1). The mean initial weight, final weight, increment in weight, percentage increment in weight, daily gain in weight, final total production, mortality rate, food conversion ratio and condition factor were 5.34 gm, 517.55 gm, 512.21 gm, 9592%, 1.31 gm, 1900kg, 8.23%, 2.66 and 1.05 respectively (Table 2).

The fish under investigation attained an average final length and weight of 38.18 cm and 517.55 gm/ fish for the 1st year of rearing respectively.

Bou Ain[3] recorded an average length of 16.7 cm of the first year (*Dicentrarchus labrax*) in Tunisian water.[2] recorded back-calculated lengths of 23cm and 24cm for males and females of sea bass at Bardawil Lake during the first year respectively. They recorded average back-calculated lengths of 28cm and 41cm for males and females of sea bass during the second year at Bardawil Lake respectively. Also,[2] recorded an average back-calculated weights of 110 gm and 113 gm for males and females of sea bass at the end of the first year respectively at Bardawil Lake. They recorded an average back-calculated weight of 198 gm and 610 gm for males and females sea bass (*Dicentrarchus labrax)* during the second year at Bardawil Lake respectively. [23] recorded an average length of 21.76 cm and an average weight of 230.01 gm for sea bass at the end of the first year at Suez Canal region. She recorded an average length of 24.26 cm and an average weight of 301.87 gm for sea bass during the second year.

The results of the present work indicate the validity and importance of sea bass culture where the average final length and weight of cultured sea bass during the first year are higher than that recorded by [2,23] for the first and second year lengths and weights of sea bass at the open water.

The growth rates were low during the winter months (Table 1 and Fig. 1) where feeding activity become low during winter. The same observations were recorded by[25,19] mentioned that the survival and growth of sea bass are more dependent on temperature than on population density.

The condition factor (k) which measures the degree of well-being of the cultured sea bass ranged from 0.88 to 1.27 with an average of 1.05 (Table 1)[23] recorded that (k) factor decreased with the increase of the length. She recorded an average k factor of 1.43 for sea bass at Suez Canal region.

The final production reached 1900 kg/feddan, which indicate the importance of sea bass culture, and the high outcome obtained.

Although the returns are relatively high, the absence of capital investments is the major reason why sea bass culture has not yet developed in Egypt. Semi-intensive and intensive sea bass cultures are advised to overcome the problems of malnutrition and for a good use of land and water.

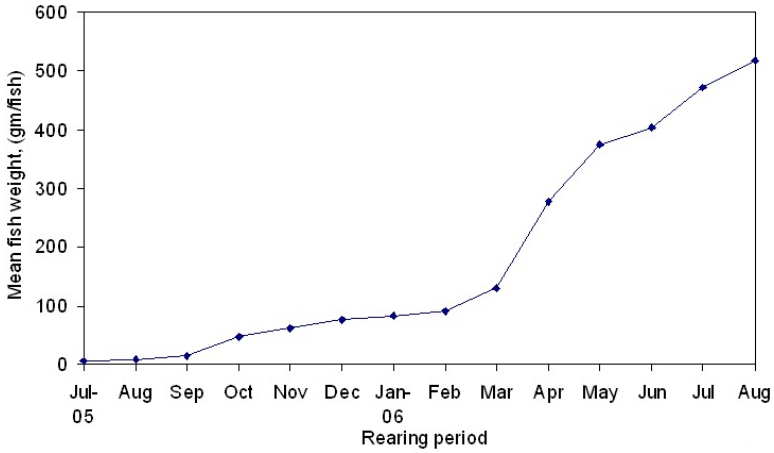

Fig. 1: Growth in weight (gm/fish) of sea bass (*Dicentrarchus labrax*)

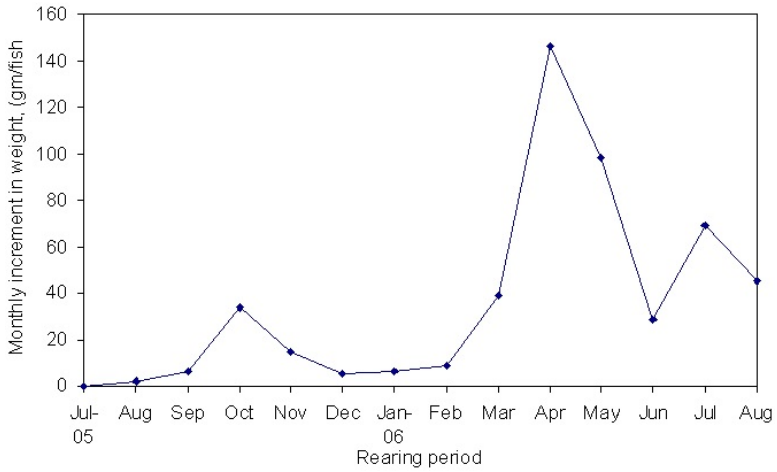

Fig. 2: Monthly growth in weight (gm/fish) of sea bass (*Dicentrarchus labrax*)

Table 1: Monthly variations in growth of sea bass (*Dicentrarchus labrax*) reared in brackish water fish farms.

Months	Days after stocking	Mean total length (cm)	Mean total weight (gm)	Increment in weight (gm)	Daily gain in weight (gm)	Condition factor (k)
July,2005	0	7.96	5.34	0.00	0.00	1.06
Aug.	30	9.31	7.59	2.16	0.07	0.93
Sep.	60	11.42	13.6	6.10	0.20	0.91
Oct.	90	15.5	47.2	33.6	1.12	1.27
Nov.	120	17.8	61.8	14.6	0.49	1.10
Dec.	150	18.43	76.2	5.40	0.18	1.16
Jan,2006	180	19.4	82.2	6.00	0.20	1.13
Feb.	210	20.3	90.9	8.70	0.29	1.09
Mar.	240	23.2	130.0	39.1	1.30	1.04
Apr.	270	29.11	276.4	146.4	4.88	1.12

Table 1: Continue

May	300	33.8	274.6	98.2	3.27	1.22
June	330	35.8	403.3	28.7	0.96	0.88
July	360	37.3	472.5	69.2	2.31	0.91
Aug.	390	38.18	517.55	45.05	1.50	0.93
Average	----	----	----	38.71	1.29	1.05

Table 2: Evaluation of growth rate of sea bass (*Dicentrarchus labrax*) under semi-intensive rearing conditions.

Items	Rate
Average initial weight (gm/fish)	5.34 ±3.63
Average final weight (gm/fish)	517.55 ±88076
increment in weight (gm/fish)	512.21
% increment in weight /fish	9592.0
Rearing period /day	390.0
Daily gain in weight (gm/fish)	1.310
Stocking density	4000.0
Initial total weight (kg)	21.360
Final total production (kg)	1900.0
Number of dead fish	329.0
Mortality rate (%)	8.230
Total food consumed (kg)	5000.0
Total net production (kg)	1878.64
Food conversion ratio	2.6600
Average initial length (cm/fish)	7.96 ±3.1
Average final length (cm/fish)	38.18 ±6.22
Average condition factor (k)	1.05

Table 3: Chemical analysis of shrimps and tilapia offered as food for sea bass.

Ingredients	Shrimp %	Tilapia %
Dry matter	85	91
Crude protein	39.9	62.2
Fat	3.9	4.6
Crude fiber	14.1	0.7
Ash	26.6	23.2

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